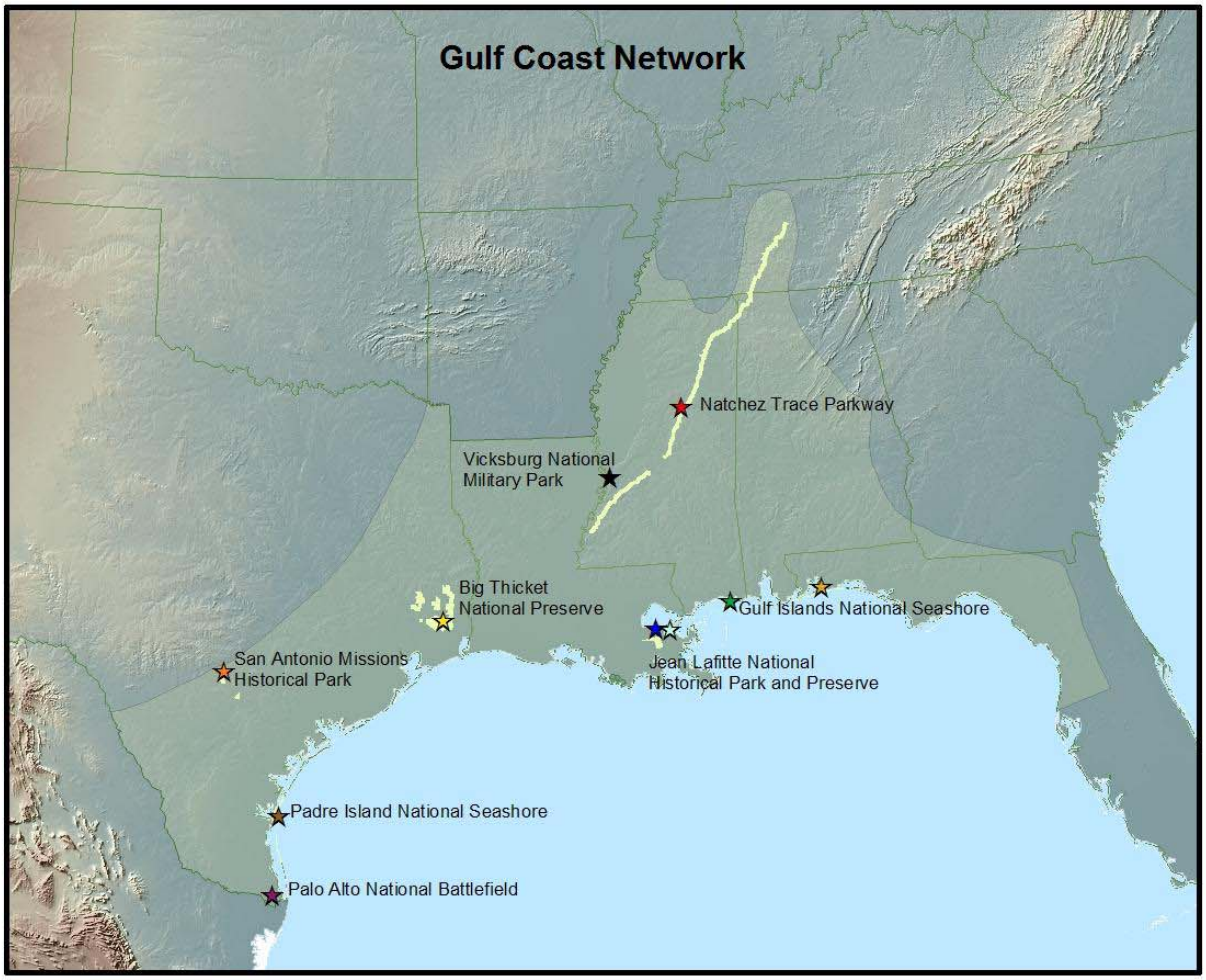
Natural Resource Summary for Vicksburg National Military Park (VICK)

FINAL REPORT

November 2004



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EXECUTIVE SUMMARY

Vicksburg National Military Park (VICK) was established to commemorate the 1863 Siege of Vicksburg by managing and protecting all of the parks resources (natural and otherwise) associated with the Siege. Although inventories for several of the biological communities have occurred during recent years, much of what is known about the park's natural resources has come from staff observations, many of which were documented in the 1997 Resource Management Plan. Currently there are seven Federal or State listed plant and animal species that have been documented in or are possible inhabitants of VICK, including one plant, one mammal, three reptiles, and one bird.

The vegetation in the park has changed greatly from the 1863 historical open landscape and now consists of a mix of forested and open grassy areas. Attempts to protect the area from erosion and a lack of maintenance funds over the years have created a very different vegetation community than originally existed at the onset of the park. Knowledge of the vegetation on VICK is limited to a recent survey of plants conducted by The Nature Conservancy. The forest was described as a mixed mesophytic forest although the dominant trees on the park consisted of southern red oak and white oak instead of the typical beech and cucumber tree found in this habitat type. VICK is located on the only major southward extension of this forest type, which stretches down through Mississippi to Louisiana and exists in an area known as the Blufflands. The variation in species composition was attributed to the relative infancy of the forest in VICK. Two hundred and ninety-nine plant species from 95 families were found in the park. In the near future, the U.S. Geological Survey (USGS) will conduct the first vegetation mapping within the park to delineate the various plant communities that exist and the relative area of the park it comprises. A single attempt has been made to examine the aquatic vegetation of the park. No vascular plants were documented within the streams during the surveys. Riparian vegetation (up to 2 m out from the stream) was also sampled to document presence or absence. Twenty-four families were documented within these drainages during this preliminary assessment.

Not much information exists regarding the mammalian population within the park. No complete inventories have been collected. Instead, park lists were based on sightings, scat and range maps. A list of thirty-nine species that may exist within the park has been compiled. Mammal inventories are scheduled to be conducted in the near future.

One survey of the park's herpetofauna has been conducted on VICK. This survey documented 27 reptilian species within the park and an additional 35 species that could possibly be found within the boundaries of the park. This herpetological survey also documented 17 species of salamanders and listed 20 additional species that could possibly exist within the park based on museum collections, distribution maps and reports. The history, location, geology, hydrology and vegetation of the park greatly affected the species found during this survey. Populations of amphibians and reptiles that existed during the Civil War were likely nearly extirpated due to the clear-cutting of the forests and subsequent extreme erosion of the land. Following the war, reestablishment of populations would have likely been slow due to the continuous erosion on the park and the development occurring in Vicksburg and the surrounding countryside. Additionally, the variable hydrology of the park, which ranged from flooded streams and

swamps to intermittent streams and pools, but contained no permanent standing water, affected both availability of appropriate breeding habitat and the likelihood of detection.

Over 185 bird species have been documented on the park. The existing knowledge of the bird population within VICK comes mainly from two recent studies that have been conducted on the park and in the surrounding area. The USGS conducted one study that compared avian usage during migration of bottomland and upland forest in four locations around Vicksburg Mississippi, including one site that was located in VICK. Using both area searches and mist-nets, they documented 67 bird species on the park during the spring migration. A second study, conducted by the National Audubon Society and USGS, used roadside point counts throughout the migration and breeding period of 2003 and 2004. Ninety-three species were detected during the first year. The National Audubon Society also has conducted surveys in Vicksburg over multiple years.

Fish populations have been very well studied since 1997 for the park's two main waterways, Mint Springs and Glass Bayou Creeks, and their tributaries. No studies prior to this investigation had examined the fish community within the park. Over a seven year period, more than 700 sites were sampled within the park and 18 species of fish were documented. Species composition varied between drainages with the greatest diversity occurring in the lower Mint Springs drainage due to its proximity to the Yazoo River Diversion Canal (which empties into Mississippi River) and its accessibility to those fish populations.

Information on park invertebrates was limited in scope. Recent studies have focused on the aquatic invertebrates, but no studies have been conducted on the terrestrial invertebrates of VICK. One study has been conducted on the aquatic invertebrates of the park's two major waterways and documented almost 10,000 individuals from 31 different taxa. The diversity of invertebrates was higher in the upper reaches of Mint Springs than its lower reaches, due to the existence of various microhabitats and possibly the lack of predatory fish in the upper reaches that allowed one species of invertivorous fish to thrive and consequently reduced the pressure on a variety of insects.

Geology of the park has been detailed through a number of documents. Some information was gathered through visual evidence that exists on the park, while others documented the larger scale geology of the area. During construction on a portion of the park, soil borings found (from shallow to deep), Pleistocene-age loess, Oligocene-age soils of the Catahoula Formation, the Vicksburg Group and the Forest Hill Formation. The advancement and recession of the Pleistocene glaciers in northern North America created a fine rock powder that would be carried down the continent in many tributaries including the Mississippi River. As the fine particles were deposited in the flood plains and the water from the glacier melt receded, these particles were swept up by the wind and deposited on the bluffs of the Mississippi and the surrounding areas, creating varying depths of what is known as loess soil.

No studies have been conducted on VICK to determine the air quality within the park although Vicksburg and Warren County have a number of industrial manufacturers that likely produce air pollutants that directly affect the park. Sulfur dioxide, a known airborne byproduct of a number of these industries, reacts with water vapor and produces sulfuric acid and falls as acid rain.

Monuments and markers show signs of damage due to acid rain, including pitting of stone and corrosion of decorative metals. There was no information on the effect of these pollutants on the park's natural resources. Additionally, regional air quality monitoring is performed within proximity to Vicksburg: Wet deposition is monitored in Clinton, 30 miles east; Dry deposition is monitored in Coffeeville, 135 miles northeast; Visibility is monitored in Sikes, LA, 100 miles west; and Ozone is measured in town, 10 miles south of the park.

Although there is no baseline data available for the groundwater for the park, one study was conducted on the groundwater potential for the Vicksburg industrial park area, just west of the northern end of the park. The principle water supply for this area was in the alluvium layer, which was harder, higher in temperature, and contains more iron than the lower formations.

Surface water quality on the park has been extensively studied in the recent past. Physiochemical and physical water quality data has been collected on several of the park's streams, including Mint Springs Bayou, Glass Bayou, two tributaries of Stout's Bayou, and their associated drainages. Although pollution of the surface water (raw sewage and agricultural runoff) from outside sources has been noted in the past, aquatic invertebrate sampling from this recent study generally indicate good water quality.

Four major habitats exist within or in close proximity to the park: forest, stream, mowed grassland and river. Aspects of two of these habitats have been studied within the park, including an avian habitat use study of forested land and an aquatic study that examined the water quality, habitat, fish and invertebrate communities, and vascular plants.

The park currently contends with four major management issues, many of which are interconnected: erosion, change in vegetation, exotic species and adjacent land-use impacts. The predominance of highly erodible loess soils in the area has created problems for the park due to the loss of soil and alterations to the vegetation in attempts to reduce this loss. The vegetation has changed drastically across the park since the battle of Vicksburg, partly due to efforts designed to reduce erosion, so that it currently does not accurately reflect the historic scene. Additionally, there are 81 exotic plant species, 12 of which are considered invasive and none of which did not exist during the battle, that compete with the native vegetation for habitat requirements on the park. Of the non-native species, kudzu, Japanese honeysuckle, Chinese and Japanese privet, Chinese parasol tree, English ivy, Chinaberry, nandina, trifoliate orange, and Johnsongrass are the dominant species of concern for the park. Because of the rapid growth of kudzu and difficulty in controlling it once it was established, it is a major management concern despite the relatively small acreage it occupies. Control of kudzu in some sites has had limited success. There are also a couple of non-indigenous faunal species that have been detected on the park including the fathead minnow and red imported fire ants. Both species are being actively controlled. The green sunfish has been introduced in the Upper Mint Springs Creek in an attempt to reduce populations of the fathead minnow. Control of fire ants has had limited success. Lastly, the close proximity of Vicksburg also has influenced the park's natural resources by negatively impacting the air and water quality, destroying viewsheds, increasing vandalism, and allowed for the transfer of exotic plant and feral animal species. In addition to possible air and water pollution caused by local industries, higher water temperatures have been documented in Glass Bayou and Mint Springs Creeks due in part to increased sedimentation in

the stream caused by urban development. Stray pets from the surrounding area can lead to feral populations of cats and dogs and have an unknown impact on native animal populations as well as provide a safety concern for visitors.

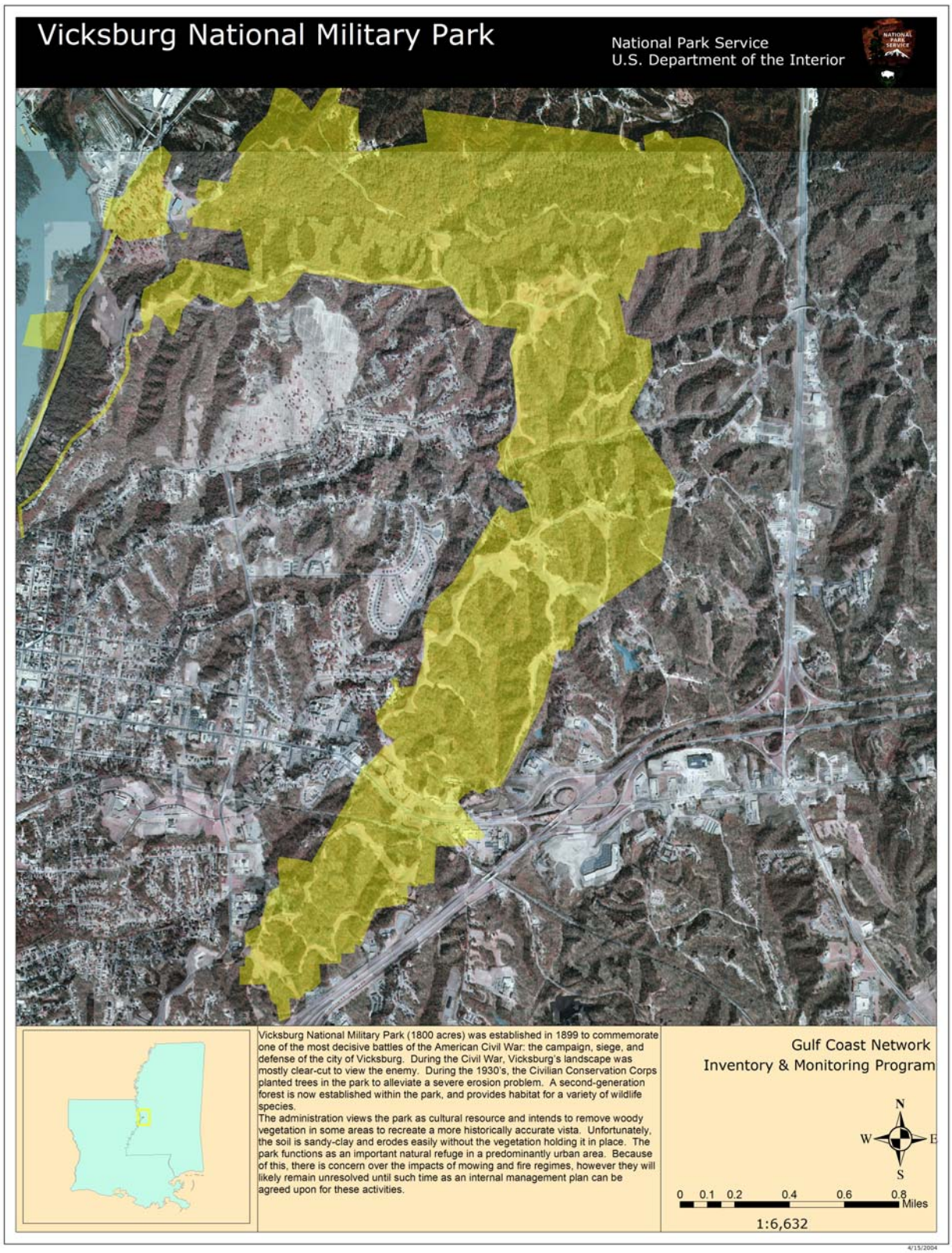

Figure 1. Location and extent of the VICK, one of eight parks in the Gulf Coast Network.

RESEARCH REVIEWS

BIOLOGICAL RESOURCES

Inventories for several of the biological communities have occurred during recent years, but much of what is known about the park's natural resources came from staff observations, many of which were documented in the 1997 Resource Management Plan (hereafter RMP 1997) (Wells 1997).

VEGETATION

Introduction

Vicksburg National Military Park (VICK) was established to commemorate the 1863 Siege of Vicksburg by managing and protecting all of the parks resources (natural and otherwise) associated with the Siege (Wells 1997). The vegetation in the 1800-acre park has changed greatly from the 1863 historical landscape and now consists of a mix of forested and open grassy mowed areas. Early photos showed a landscape of open fields largely devoid of trees. Attempts to protect the area from erosion and a lack of maintenance funds over the years have created a very different vegetation community than originally existed at the onset of the park. Knowledge of the vegetation in VICK is limited to a recent survey of plants on the park. No vegetation mapping has occurred within the park to delineate the various plant communities that exist and the relative area of the park it comprises (Wells 1997). It's generally accepted that two-thirds of the park are forested, and one-third is kept in a "mowed lawn" appearance. Vegetation mapping will obviously elucidate which vegetation types comprise the forested portion (K. Foote, personal communication, 1 April 2004). The U.S. Geological Survey (USGS) will begin vegetation mapping during 2004.

Surveys, checklists

The Nature Conservancy conducted an inventory of the vascular flora of VICK during the 1996 and 1997 growing seasons (Walker 1997). Walker described the forest of VICK as a mixed mesophytic forest although the species composition differs from the general description of this forest type. VICK is located on the only major southward extension of this forest type, which stretches down through Mississippi to Louisiana and exists in an area known as the Blufflands. Walker (1997) found the dominant trees on the park consisted of southern red oak (*Quercus falcata*) and white oak (*Quercus alba*) instead of the typical beech (*Fagus grandifolia*) and cucumber tree (*Magnolia acuminata*) found in this habitat type. Walker (1997) attributed these differences to the relative infancy of the forest in VICK. Habitats were categorized as highly disturbed (e.g., roadside), little recent disturbance (e.g., forested areas), streams and riparian areas, mesic north slopes and ravines. Two hundred and ninety-nine species from 95 families were found in the park. The greatest species diversity was found in disturbed areas with 66.6% of species found in this habitat. Walker created a checklist with location, habitat, blooming dates, abundance and noted if it was native to the area. Samples of all species were collected and stored in a herbarium on the park grounds. No Threatened or Endangered species were known to exist in the Vicksburg area and none were detected within the park during this survey although prairienymph (*Herbertia lahue*), a State Specie of Special Concern, has recently been detected.

Previously a pamphlet had been created by the National Park Service (NPS) listing wildflower species and blooming times for VICK and contains 65 native and introduced species (NPS n.d.-b).

Dibble (2003) attempted to examine the aquatic vegetation of Mint Springs, Glass Bayou and Stout's Creeks. No vascular plants were documented within the streams during the surveys. Riparian vegetation (up to 2 m out from the stream) was sampled twice during 2003 using transect counts and random/stratified 1 m quadrant samples to document presence or absence. Twenty-four families were documented within these drainages during this preliminary assessment.

Non-indigenous vegetation

A large number of the species found within the park boundaries were not indigenous to the area. During the latest survey, Walker found that 28 percent of the species detected were not native to Mississippi. According to the RMP 1997 there was four major exotic species on the park, kudzu (*Pueraria lobata*), Japanese honeysuckle (*Lonicera japonica*) and Chinese and Japanese privet (*Ligustrum sinense and L. japonicum*, respectively). Johnsongrass (*Sorghum halepense*) may need to be listed as a major exotic species, as it is present and highly invasive (K. Foote, personal communication, 1 April 2004.). Due to the rate at which it spreads, kudzu was considered the greatest threat to the native landscape. In a current attempt to stabilize the highly erodible loess soil found on the park, a non-native grass, Bermuda grass (*Cynadon datcylon*), has been planted on about 30% of the park. These open grassy areas are maintained through mowing and some prescribed fire. Five additional species, Chinese parasol tree (*Firmiana simplex*), English ivy (*Hedera helix*), Chinaberry (*Melia azedarach*), nandina (*Nandina domestica*), and trifoliate orange (*Poncirus trifoliata*), have recently been added to the park's exotic species of concern (K. Foote, personal communication, 9 September 2004).

General plant studies

Few studies have been conducted on individual plant species within the park. Affeltranger et al. (1976) documented the mortality of winged elm (*Ulmus alata*) in VICK due to a combination of vascular wilts and Dutch Elm disease. This was the southern most record of Dutch Elm disease in the Southeast.

Experts: vascular plants: Stephen Walker (The Nature Conservancy); forests/woodlands: Tommy Walker (MS Forestry Commission), aquatic vegetation: Eric Dibble (Mississippi State University)

MAMMALS

Introduction

Not much information exists regarding the mammalian population within the park. No complete inventories have been collected. Instead, park lists were based on sightings, scat and range maps. Mammal inventories are scheduled to be conducted by Mike Mengak from the University of Georgia in the near future.

Surveys, checklists, general studies

A list of thirty-nine species that may exist within the park was compiled from Whitaker (1980). Although no official inventories of mammals have been conducted, thirty-six of these species were listed on the park's website as residents of the park (VICK 2003b). There was a concern that the white-footed deer mouse or white-footed mouse (*Peromyscus leucopus*) may exist within the park and pose a threat to visitors as it is the host for Hantavirus (Wells 1997). A 2002 report of the herpetofauna of VICK remarked that a large community of predator mammals, including raccoons (*Procyon lotor*), armadillos (*Dasypus novemcinctus*), opossums (*Didelphis virginiana*), red foxes (*Vulpes fulva*), striped skunks (*Mephitis mephitis*), coyotes (*Canis latrans*), domestic dogs (*Canis familiaris*) and felids (*Felis catus*), exists within the park due to the lack of hunting (Keiser 2002). Anecdotal evidence indicated that these predators likely affected the herpetofaunal population within the park. No Threatened or Endangered species have been documented, although the oldfield mouse (*Peromyscus polionotus*), a State Species of Concern, may exist on the park (K. Foote, personal communication, 1 April 2004; VICK 2003a). A pamphlet was created by NPS on the mammals of VICK (NPS n.d.-a).

Experts: Chester Martin (U.S. Army Corps of Engineers), Mike Mengak (University of Georgia)

HERPETOFAUNA

Introduction

Keiser (2002) conducted the first published survey of amphibians and reptiles in VICK during 2001 and 2002. The inventory consisted of field studies and surveys of museum collections. Although there were short visits to the satellite sites, the focus of the surveys occurred on the main park northeast of Vicksburg. The history, location, geology, hydrology and vegetation of the park greatly affected the species found during this survey. Populations of amphibians and reptiles that existed during the Civil War were likely nearly extirpated due to the clear-cutting of the forests and subsequent extreme erosion of the land. Following the war, reestablishment of populations would have likely been slow due to the continuous erosion and the development occurring in Vicksburg and the surrounding countryside. With reforestation initiated by the Civilian Conservation Corps (CCC) in the 1930's, it was likely that the reestablishment of the forest has occurred just in the last 50-70 years. The current proximity to the city of Vicksburg and surrounding suburbs has in general isolated the park's herpetofauna from other nearby

populations. Vegetation in some areas of the park was thick and impassable or consisted of a thick ground cover that made animal detection difficult. Additionally, the variable hydrology of the park, which ranged from flooded streams and swamps to intermittent streams and pools, but contained no permanent standing water, affected both availability of appropriate breeding habitat and the likelihood of detection.

Reptiles

Keiser (2002) found 27 reptilian species (nine turtles, four lizards and 14 snakes) within the park. Three of the snakes found during the field survey were venomous. Based on surveys of museum collections, species distribution maps and available literature, five additional species of turtles, six species of lizards and 24 species of snakes (both temporary and resident species) could possibly be found within the boundaries of the park. No Threatened or Endangered reptiles were found within the park although the American alligator (*Alligator mississippiensis*; Federally Threatened), is likely to be detected on future surveys. Voucher specimens were collected for each species and are housed at the Mississippi Museum of Natural Science (MMNS) in Jackson, Mississippi. Recent data has identified two turtle species that are State Species of Special Concern- Mississippi map turtle (*Graptemys pseudogeographica*) and Alligator snapping turtle (*Macrochelys temminckii*; K. Foote, personal communication, 1 April 2004).

Amphibians

The 2002 herpetological survey documented 5 salamander and 12 frog and toad species (Keiser 2002). Although not found during the surveys, based on museum collections, distribution maps and reports, 10 additional anurans and 10 salamander species could exist within the park. Sample specimens for all species collected were located at the MMNS. No Threatened or Endangered amphibian species were found during the surveys or were thought to exist within the park. Two shallow pools found late in the study were ovipostion sites for frogs and salamanders, but neither site remained wet long enough for the eggs to fully mature, resulting in thousands of dead frog, toad and salamander larvae.

Experts: Edmund Keiser (University of Mississippi)

BIRDS

Introduction

The existing knowledge of the bird population within VICK comes from two studies that have been conducted on the park and in the surrounding area. Studies have been conducted during the spring migration, breeding periods and winter.

Surveys, checklists, general studies

Over 185 species have been documented on the park. At least 35 of these species were associated with the river, but can be seen from the park. The Federally Threatened Bald eagle (*Haliaeetus leucocephalus*) has recently been confirmed as definitely utilizing the park on an occasional basis (K. Foote, personal communication, 1 April 2004). Interior Least Tern (*Sterna antillarum athalassos*), a Federally Endangered Species may also utilize the park occasionally (VICK 2003a).

Twedt and Hunt (2001) compared avian usage during migration of bottomland and upland forest, which were either fragmented or intact, in four locations around Vicksburg Mississippi. One site was located in VICK. The current management of the park, which maintains large open areas for historical purposes, together with the dominant residential landuse that surrounds the park, has created a 'fragmented' upland hardwood habitat within the park. Using both area searches and mist-nets, they documented 67 bird species on the park during the spring migration. An additional 10 species were detected in the nearby 'intact' upland forest of Haynes Bluff. Only 6 species seen in both of the upland hardwood sites (77 total) were not found on the bottomland hardwood sites, and 33 species were found on bottomland sites, but absent on the upland sites. Most species detected on all sites were migrants from Central America and the Caribbean, returning to North America to breed. Although this study provided important baseline data, due to the short period (5 surveys in 1 ½ months) in which the data was collected and the variation that can occur due to season, limited conclusions can be drawn from this study.

The Christmas Bird Counts, a long-term monitoring program designed to monitor the status and trends of wintering avian populations in North America, has surveyed the populations in Vicksburg over multiple years (National Audubon Society 2004). Surveys, which have occurred on the park and in the surrounding areas, were first conducted in 1953, then not again until 1981. Since 1981, Vicksburg has been sampled every year including the latest in 2003. The Breeding Bird Survey, another type of long-term monitoring project that consists of 50 three-minute point counts along a 24.5-mile route during the breeding season, have not been conducted in or near the park. However, in a join effort between the National Audubon Society and USGS, Somershoe et al. (2004) conducted mini-Breeding Bird Survey routes within VICK, which consisted of 20 three-minute roadside point counts conducted throughout the migration and breeding period of 2003. Ninety-three species were detected during the entire period and an average daily population of >8500 birds were estimated during migration. It was likely that 56 of these species bred on site. These surveys were repeated during 2004. HawkWatch International has also conducted multiple-year survey in the area (K. Foote, personal communication, 9 September 2004).

Experts: Dan Twedt and Scott Somershoe (USGS- biological Resources Division), Bruce Reid (National Audubon Society, MS Chapter)

FISH

Introduction

Fish populations have been very well studied since 1997 for the park's two main waterways, Mint Springs and Grass Bayou Creeks, and their tributaries (Dibble 2003). Preliminary samples were also taken from the lower reaches of Mint Springs Creek during 1995. No studies prior to this investigation had examined the fish community within the park.

Surveys, checklists, general studies

Over a seven year period, more than 700 sites were sampled using a backpack electro-fishing unit and 18 species of fish were documented within the park (Dibble 2003). Species composition varied between drainages with the greatest diversity occurring in the lower Mint Springs drainage due to its proximity to the Mississippi River and its accessibility to those fish populations. The natural rock outcrop between the lower and middle/upper reach of Mint Springs likely prevents these species from reaching the top areas (Harrel & Dibble 1998). The lower reach may also serve as a nursery for riverine species (Harrel & Dibble 1998). One introduced species was found on the park (fathead minnow, *Pimephales promelas*) and dominated the catches in the upper reach of Mint Springs Creek (Dibble 2003). The green sunfish (*Lepomis cyanellus*) was introduced in 1999 into the upper reaches of Mint Springs as an experiment to reduce the fathead minnow populations (Dibble 2003). Once abundance levels are reduced, it was recommended that native species should be reintroduced (Dibble 2003; Dibble & Smiley 1999). Dibble and Smiley proposed that the green sunfish had a top-down effect on the stream community in the lower reaches where it was present that allowed for a diversity of fish, but consequently a lower diversity of insects. The reverse was found in the upper reaches where it was not present. No Threatened or Endangered species were documented on the park.

Experts: Eric Dibble (Mississippi State University)

INVERTEBRATES

Introduction

Information on park invertebrates was limited in scope. Conrad (1847) identified 111 fossilized invertebrate species from the Vicksburg area. Recent studies have focused on the aquatic invertebrates, but no studies have been conducted on the terrestrial invertebrates of VICK.

Aquatic Invertebrates

One study has been conducted on the aquatic invertebrates of the park's two major waterways, Mint Springs and Glass Bayou Creeks. Dibble (2003) examined the aquatic invertebrate population in his biological assessment of the streams in VICK. Macroinvertebrate data were collected using dipnets (along 5 m transect) from two park streams and their tributaries from

1998 to 2003. Almost 10,000 individuals were collected from 31 different taxa. Three orders of insects - mayflies (Ephemeroptera), caddisflies (Trichoptera) and stoneflies (Plecopterans) - generally indicate good water quality and stream conditions. The first two were detected at the sites, but stoneflies were absent. Mussels were not detected during the study, but no sampling occurred that specifically targeted this group. In an early annual report, Harrel and Dibble (1998) found that the diversity of invertebrates was higher in the upper reaches of Mint Springs than its lower reaches, due to the existence of various microhabitats. Dibble and Smiley (1999) proposed this that variation was due to the lack of predatory fish in the upper reaches of Mint Springs that allowed one species of invertivorous fish to thrive and consequently reduced the pressure on a variety of insects. Abundance levels were higher on Mint Springs than Glass Bayou, but both creeks followed the same trends throughout the year. Diversity between the two streams was similar.

Experts: aquatic invertebrates: Eric Dibble (Mississippi State University); terrestrial invertebrates: Terry Rector (MSU County Extension Office; expertise- natural pests and disease)

THREATENED AND ENDANGERED SPECIES

A number of federal and state listed Threatened or Endangered species have been documented or have ranges that may allow them to exist in VICK. A compilation of these species adapted from communications with the park's biologist and a number of park documents exists in Appendix A (K. Foote, personal communication, 1 April 2004; Dibble 2003; Keiser 2002; VICK 2003a; Walker 1997).

PHYSICAL RESOURCES

GEOLOGY

Introduction

Geology of the park has been detailed through a number of documents. Some information was gathered through visual evidence that exists on the park, while others documented the larger scale geology of the area.

Geomorphology, soils

Morse (1935) provided a detailed description of the geology of the park. The Coastal Plains deposits were laid down in the late-Mesozoic when the Gulf reached much farther north and covered a large portion of the southern United States. The calcareous shells of marine invertebrates, which inhabited shallow waters during the Oligocene period, were ground into fragments by wave actions and formed the basis of the limestone and shell marl. Most of the fossils that exist within the park today belong to the later Byram era, in which clam-like forms, snails and corals were plentiful. The following ages produced layers of sand and some clay, then a uniform mixture of sand and gravel on which there has been no consensus as to the manner in which it was deposited. During this period, the advancement and recession of the Pleistocene glaciers in northern North America created a fine rock powder that would be carried down the continent in many tributaries including the Mississippi River. As the fine particles were deposited in the flood plains and the water from the glacier melt receded, these particles were swept up by the wind and deposited on the bluffs of the Mississippi and the surrounding areas creating varying depths of what is known as loess soil.

Due to land slides or construction, a limited number of investigations have occurred within the park that have provided information on the soils and geology of the park. An investigation into an earth slide on Mint Springs, conducted by the U.S. Army Corps of Engineers, provided information on the geology and soils in this area of the park (Sherman 1962). Soil samples revealed a heterogeneous mixture of colluvial loess over Tertiary deposits, which consist of the Byram marl formations. During construction on the Vicksburg Cemetery, soil borings (to a maximum of 75 feet) taken at the cemetery found (from shallow to deep), Pleistocene-age loess, Oligocene-age soils of the Catahoula Formation, the Vicksburg Group and the Forest Hill Formation (Burns Cooley Dennis Inc 2002). Few areas on the park show exposed bedrock. Mint Spring was one such area that also contained a large number of fossils from the Byram era. Some good specimens of flowstone and dripstone have been found within the exposed cave passage along the Glass Bayou tributaries (Wells 1997).

Morse (1935) also discussed how the geology of the area influenced military history. The topography of the land was considered when determining placement of earthen forts. Forts were placed atop high points with steep slopes, which aided in slowing the advancements of enemy attacks. Loess soil has unique properties that allow vertical cuts in the soil without support. This created vertical or overhanging cliffs and steep hillsides along stream cut valleys and would have created a formidable challenge for attacking armies. If covered by vegetation, man-made

structures could also be cut vertically without stabilization, which made it a perfect soil to excavate for tunnels or trenches. Additionally the high bluffs, also created by the loess deposits, on which the city of Vicksburg sits, helped protect the city from attacks from the water during the Civil War. Although the unique properties of the loess soil created a beneficial situation for the Confederate Army during the Civil war, other aspects of the soil properties proved to be problematic. Since the soil was deposited by wind rather than water, it was loosely compacted and has a high potential for erosion.

General studies

Fossilized mollusk shells and fish otoliths were collected at the base of the waterfall on Mint Spring Bayou at VICK. The fossils were analyzed to examine the historic water temperatures of the ocean that covered this area and central Mississippi during the Early Oligocene. This data was collected to help examine the hypothesis that there was climatic cooling between the Eocene and Oligocene (Dockery & Ivany 2002).

Experts: Willie Taylor (Natural Resources Conservation Service), David Dockery

AIR QUALITY

No studies have been conducted in VICK to determine the air quality within the park. Vicksburg and Warren County have a number of industrial manufacturers that likely produce air pollutants that directly affect the park (Wells 1997). Sulfur dioxide, a known airborne byproduct of a number of these industries, reacts with water vapor and produces sulfuric acid. When clouds form with these compounds, the resulting precipitation is overly acidic and termed acid rain. Monuments and markers show signs of damage due to acid rain, including pitting of stone and corrosion of decorative metals. There was no information on the effect of these pollutants on the park's natural resources.

The park's air quality can be assessed from National Atmospheric Deposition Program/National Trends Network (NADP/NTN) data collected at the Clinton, Mississippi site (#MS10, ~25 miles E of VICK) that has been operating since 1984. Clinton site data show a slight decrease in wet sulfate concentration and deposition, but no trend in wet nitrate concentration and deposition and no trend in wet ammonium concentration and deposition. The nearest NADP Mercury Deposition Network (MDN) sites are at Oak Grove, Perry County, Mississippi (#MS22, ~135 miles SE of VICK), Chase, Louisiana (#LA10, ~50 miles W of VICK), and Alexandria, Louisiana (#LA23, ~110 miles NE of VICK; T. Maniero, personal communication, May 2004).

The nearest Clean Air Status and Trends Network (CASTNet) sites are at Coffeeville, Mississippi (site #CVL151, ~130 miles NE of VICK) operational since 1988 and at Caddo Valley, Arkansas (#CAD150, ~200 miles NW of VICK). The nearest Interagency Monitoring of Protected Visual Environments (IMPROVE) site is at Sikes, Louisiana. (#SIKE, ~100 miles W of VICK) and the Sipsey Wilderness Area, Alabama (#SIPS, ~ 265 miles NE of VICK) operational since 1992. While there has been no trend at the Coffeeville site in dry sulfur

deposition, dry nitrogen deposition increased through 1995, and then leveled off. CASTNet estimates total nitrogen deposition at Coffeeville is composed of 31% dry deposition and 69% wet deposition, while total sulfur deposition is 23% dry and 77% wet. Caddo Valley site data indicate no trends in either dry sulfur or dry nitrogen deposition. Total nitrogen deposition is composed of 24% dry deposition and 76% wet deposition, while total sulfur deposition is 16% dry and 84% wet (T. Maniero, personal communication, May 2004).

Mississippi has been monitoring air toxics for two years at Tupelo and Jackson and a site at Grenada will be added soon. The sites monitor the 33 pollutants that are part of the U.S. Environmental Protection Agency's (EPA) Urban Air Toxics Monitoring (UATM) Program (T. Maniero, personal communication, May 2004).

Park-related data for Persistent Organic Pollutants (POP) and heavy metals is being compiled this year by academic researchers, though no on-the-ground monitoring for these substances will occur on the park (K. Foote, personal communication, 1 April 2004).

Summaries of past years' ambient air monitoring data for ozone and particulate matter are available on the Mississippi Department of Environmental Quality (MDEQ) website (Mississippi Department of Environmental Quality 2004). A searchable database for historic and current air quality measurements for the state including stations in the Vicksburg area is also available through a link from MDEQ to the U.S. Environmental Protection Agencies website.

Experts: Mary Evelyn Barnes and Jerry Beasley (Air quality, Office of Pollution Control Air Division)

HYDROLOGY

Groundwater

There was no baseline data available for the groundwater for the park. Harvey and Callahan (1962) conducted a study to determine the groundwater potential for the Vicksburg industrial park area, just west of the northern end of the park. The alluvium layer provided principle water supply for this area. Water may also be available below the alluvium layer in the Cockfield formation and Sparta Sand. Water in the alluvium was harder, contains more iron and a higher temperature than the lower formations. Dissolved solid levels were 600 ppm in the Alluvial layer.

The USGS maintains a searchable database of the state, including the Vicksburg area, for historic and current water levels, quality and flow measurements (USGS 2004).

Experts: possible source: Robert A. Renken (USGS, author of Ground Water Atlas of the United States Arkansas, Louisiana, Mississippi)

Surface water

Water quality on the park has been extensively studied in the recent past. Dibble (2003) collected physiochemical and physical water quality data on three of the park's streams and their drainages. Most of the eight years of data (1995 to 2003) came from Mint Springs and Glass Bayou Creeks, with the ephemeral Stout's Bayou Creek added in 2003. Although the water temperature of Mint Springs and Glass Bayou Creeks varied within years and between streams, both showed a significant increase over the course of the study. Increased annual ambient temperature and increased sedimentation in the streams due to anthropogenic disturbances were listed as possible reasons for this increase. Aquatic invertebrate sampling found two of the three orders that generally indicate good water quality.

Pollution of the surface water from outside sources has been noted in the past. The raw sewage from upstream landowners no longer poses the same problem as it has in the past due to increased county enforcement and updated sewage systems. Agricultural runoff from outside the park however, has been noted in the recent past (Wells 1997). There has been no monitoring of the affect of acid rain caused by local industry on the park's streams. A decrease in the pH of the water could affect both the flora and fauna existing within and surrounding these streams.

Water quality data for surface water in the state, including Vicksburg, have been monitored by multiple state, federal and local agencies. To comply with Section 303(d) of the Clean Water Act, states are required to compile a list of impaired waters every two years. The 2002 list contained four waterbodies in close proximity to VICK (Table 1). Additional data on water quality (including physical and chemical parameters) and flow of Mississippi waterbodies are listed on the USGS website (USGS 2004).

Table 1. Waterbodies within VICK listed on the Mississippi state 2002 303(d) list, which denotes waterbodies that do not meet the standards set for their use.

Waterway	**Concern**	**Impaired use**
Yazoo River Diversion Canal	Nutrients; Organic enrichment/Low DO	Aquatic life support
Unnamed ditch to Yazoo Diversion Canal (at Vicksburg)	Salinity/TDS/Chlorides, Suspended Solids	Aquatic life support
Yazoo River	Pesticides, Nutrients, Siltation	Aquatic life support
Big Sunflower River	Pesticides, Nutrients, Organic enrichment/Low DO	Aquatic life support

Experts: Eric Dibble (Mississippi State University)

ECOSYSTEM STUDIES

FOREST

Twedt and Hunt (2001) compared avian presence and habitat use of bottomland and upland forests during migration. One of their study sites was located in the upland forests in VICK. They detected almost 30 percent fewer birds on the upland forest sites. They also classified the habitat (upland and bottomland forest) based on the fragmentation of the forest. The proximity of residential developments in the surrounding area and the current management for large open areas on the park have created a fragmented upland forest within VICK. When compared to avian usage of a nearby intact upland forest (Haynes Bluff) similar numbers of birds were caught on both upland sites but more birds species were detected in VICK's fragmented forest. Twedt and Hunt (2001) cautioned against drawing definitive conclusions from this study due to low sample size and the short period in which they collected the data.

MOWED GRASSLANDS

Thirty percent of the park exists as grassland, which is maintained by mowing or prescribed burns (VICK 2003a). No studies have been conducted on this habitat community.

STREAMS

The park has two major stream drainages, Glass Bayou and Mint Springs Creek (as well as their tributaries), within its boundaries along with a few minor perennial and intermittent streams. Both major streams were tributaries of the Mississippi River. Although these streams have likely changed since the historic battles, there has been no historical data collected on stream conditions and species that inhabited the sites (Harrel & Dibble 1998).

The flow of Mint Springs Creek varies from a perennial flow in the lower portions to an intermittent stream in upper portions during various times of the year. This creek has two waterfalls caused by rock outcrops. Heavy rains can create a fast moving flow, which often spills over the banks. Flooding of the Mississippi River and Yazoo Canal has caused water along the creek to surpass the banks and flood the area up to the western waterfall. Depths of the lower reaches of Mint Springs Creek have been documented to exceed 25 feet during floods (VICK 2003a). Harrel and Dibble (1998) found the width of the Mint Springs Creek varied seasonally from 12 to 15 feet and ranged in depth from 0.7 feet to 1.1 feet. Stream flow was naturally slowed by intermittent rock outcroppings. The upper portions of the stream provide habitat for fathead minnows, and green sunfish can be found in the lower portions.

Glass Bayou, the second major drainage in the park, is a shallow perennial stream throughout most of the park that flows for a short length through an exposed cave passage. Stream flow during heavy rains has been found to increase considerably over the normal flow (Keiser 2002). Harrel and Dibble (1998) compared physical parameters of the two major streams and found that Glass Bayou was a faster moving, shallower, narrower stream than Mint Springs Creek, although

only the upper reaches (which were typically faster, shallower and narrower) of Glass Bayou were sampled.

Dibble (2003) examined the aquatic communities of Mint Springs and Glass Bayou Creeks over an eight year period. He collected data on water quality, habitat, fish and invertebrate communities and the aquatic and riparian vascular plants within these drainages. In an earlier annual report from this project, Dibble and Smiley (1999) proposed that the green sunfish had a top-down effect on the stream community, which allowed for a diversity of fish, but consequently a lower diversity of insects, in the lower reaches where it was present. The reverse was found in the upper reaches where it was not present.

RIVERS

Although the Mississippi River had historically flowed pass VICK, the current path has cut off that bend and now only flows past the southern tip of Vicksburg. The waterway that currently abuts the northern portion of the park is the Yazoo River Diversion Canal.

Winger and Lasier (1998) conducted a sediment toxicity study on sites up and down stream from 5 major cities on the Lower Mississippi, including Vicksburg. They found the quality of the sediment was good around Vicksburg.

MANAGEMENT ISSUES

Because of the park's proximity to Vicksburg, it is subject to many environmental problems, including air and water quality, disturbed lands, exotic species, pests, and increased noise. Additionally, the balance between the management of the park for the cultural landscape and the biological integrity is a challenge for resource managers in this urban setting. A detailed list of management issues and concerns that face VICK and how these issues may affect the park's resources can be found in Appendix B. Four of these major issues are discussed below.

EROSION

One of the park's mandates is to maintain the 1863 historical landscape. Due to the predominance of loess soils in the area, erosion of these landforms was a major concern of the park. Extreme soil erosion occurred on the park during the early part of the last century. By 1933, erosion was such a threat to the park that the CCC was asked to establish large scale stabilization projects (VICK 2003b). After the erosion was repaired, the CCC planted trees and cleared views on the VICK (NPS 1930). Although the trees had some success controlling the erosion, today the larger tree roots direct water runoff and create patches of eroded soil. When these larger trees fell over, this exposed soil was then subject to increased erosion due to the channeling effect of the roots. The park continuously monitored for signs of erosion after a heavy rain event and steps were taken to repair the erosion damage when it was found (Wells 1997). The park has now recommended controlling soil erosion through the use of quick growing non-native grasses.

CHANGES IN VEGETATION

The vegetation has changed drastically across the park since the battle of Vicksburg so that it currently does not accurately reflect the historic scene. Early photographs showed a landscape mostly clear of trees, which had been cleared in preparation for the battle. The trees planted during the 1930's to help control erosion have since developed into a mixed mesophytic forest that has provided habitat for a variety of flora and fauna. Other areas, which were not maintained due to budget constraints, have vegetation in mixed stages of succession. Due to the park's mission to preserve the historic scene of the Siege of Vicksburg, where possible some of the forest landscape has been cleared and replanted with nonnative grasses (especially Bermuda grass) to restore the unobstructed views found during 1863 (VICK 2001). Although these forests were planted to stabilize the loess soils, there has been concern that they were not providing adequate protection against erosion. The heavy understory has obscured the detection of erosion and has created difficult conditions in which to assess these areas, while tree roots and fallen trees have also created eroded hot spots.

The park has environmental as well as cultural mandates that it must respond to, sometimes these are in conflict. Not much of this forest/soil type has been left undeveloped along the Mississippi River floodplain. Environmental groups would like this area preserved, while historical groups want the area restored (cleared) to its status at the time of the battle.

EXOTIC SPECIES

Of the eighty-one exotic plant species that compete with the native vegetation for habitat requirements on the park, at least 12 are considered invasive and kudzu, Japanese honeysuckle, privet and English ivy are the most abundant (K. Foote, personal communication, 9 September 2004 ; Wells 1997). Johnsongrass may need to be listed as a major exotic species, as it is present and highly invasive (K. Foote, personal communication, 1 April 2004.). In a current attempt to stabilize the highly erodible loess soil found on the park, a non-native grass, Bermuda grass, has also been planted on about 30% of the park. These open grassy areas are maintained through mowing and some prescribed fire. Privet in many instances acts as a visual screen and is therefore not necessarily viewed negatively (K. Foote, personal communication, 1 April 2004). Because of the rapid growth of kudzu and difficulty in controlling it once it was established, it is a major management concern despite the relatively small acreage it occupies. The kudzu infestation had increased from about 15 ac to 40 ac from 1992 to 1997. A 1996 grant from the Small Parks Natural Resource Preservation Program allowed for treatment of a 10-acre plot in 1998. Treatment of the area involved a combination of herbicides and prescribed fire to kill the kudzu. The area was then revegetated with native grasses, trees and shrubs that allowed for stabilization of the soil and attempted to reduce the sprouting of any remaining kudzu (VICK 2003b). Kudzu has since re-sprouted very prolifically within this project site, though it is now part of a long-term (5 to 10 years) treatment regime which should eventually eliminate the kudzu (K. Foote, personal communication, 1 April 2004). The partial success of this trial has allowed for expansion into several other areas on the park and has shown similar success (VICK 2001). Although treatment has been successful, the rate in which kudzu has spread and infested new areas has posed a problem. In 1999, 5 more tracts of 10-plus acres, as well as a number of

smaller areas, were found. The Japanese honeysuckle affected approximately 400-acres of park land in 1997, but was not considered as great a threat to the park due to its slower growth. The 2003 Fire Management Plan listed five species, including Japanese honeysuckle and privet, that pose the greatest threat to native vegetative communities on VNHP (Mangi Environmental Group 2003). Five additional species, Chinese parasol tree, English ivy, Chinaberry, nandina, and trifoliate orange, have recently been added to the park's exotic species of concern (K. Foote, personal communication, 9 September 2004).

There are also a couple of non-indigenous faunal species that have been detected on the park including the fathead minnow and red imported fire ants (*Solenopsis invicta*) (Dibble 2003; Wells 1997). The green sunfish has been introduced in Upper Mint Springs Creek, above a 25 foot waterfall, in an attempt to reduce populations of the fathead minnow, an introduced species. Once abundance levels are reduced, it was recommended that native species should be reintroduced. Control of fire ants has had limited success.

ADJACENT LAND-USE IMPACTS

Local industries in Vicksburg and Warren County have had an unknown effect on the air quality at VICK. Corrosion of monuments has been documented and attributed to acid rain. There has been no baseline monitoring of acid rain, ozone emissions, or air particulates on the park and no details were known on the effects on the flora and fauna of the local watershed. Park-related data for POP and heavy metals is being compiled this year by academic researchers, though no on-the-ground monitoring for these substances will occur on the park (K. Foote, personal communication, 1 April 2004). Encroachment of the neighboring city of Vicksburg has destroyed viewsheds, caused the contamination of streams and threatened the natural and cultural resources within the park. Vandalism and theft of archeological artifacts have become more of a problem. Higher water temperatures have been documented in Glass Bayou and Mint Springs Creeks due in part to increased sedimentation in the stream caused by urban development (Dibble 2003). Kudzu, as discussed above, has become a major problem on the park and originated from areas outside the park (VICK 2001). The park's close proximity to Vicksburg as well as Warren County has also created problems with stray pets, which can lead to feral populations of cats and dogs and have an unknown impact on native animal populations as well as provide a safety concern for visitors. Although no specific data has been collected, research elsewhere have shown that cats in particular can have a serious effect on the native populations of birds, herpetofauna and small mammals due to their skilled hunting abilities.

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Appendix A. Federal and State Listed Species that have been documented in or are possible inhabitants of VICK.

Species	Scientific name	Status
Plants		
prairienymph	*Herbertia lahue*	State Species of Concern
Mammals		
oldfield mouse*	*Peromyscus polionotus*	State Species of Concern
Reptiles		
alligator snapping turtle	*Macrochelys temminckii*	State Species of Concern
American alligator*	*Alligator mississippiensis*	Federally Threatened
Mississippi map turtle	*Graptemys pseudogeographica*	State Species of Concern
Amphibians		
No documented species		
Fish		
No documented species		
Birds		
Bald Eagle	*Haliaeetus leucocephalus*	Federally Threatened
Interior Least Tern*	*Sterna antillarum athalassos*	Federally Endangered
Insects		
No documented species		

Appendix B. Management issues and concerns that face VICK and how these issues may affect the park's resources

Management Issues	Priority	Significant Natural Resources Impacted	Monitoring Questions
Adjacent Landuse	HIGH	Park flora/fauna along boundary.	Is boundary encroachment having deleterious effects upon park flora/fauna?
Climate Change	HIGH	Habitat.	Will climate change happen too quickly to allow species to adapt or find distribution corridors?
Data Gaps	HIGH	All encompassing.	What mammal species (including bats) exist in the park? Where are weed patches encroaching upon native vegetation and at what rate? What is the erosion rates on cleared/uncleared land? Is water/air quality improving/decreasing?
Erosion	HIGH	Park streams, cultural landscape.	Is erosion off of cleared land leading to unacceptable erosion rates and siltation of park waters?
Exotics (Plants)	HIGH	Park biodiversity.	Are exotic plant infestations decreasing the number and amount of native plant/animal species within the park?
Fire Management	HIGH	Park landscape.	Will a prescribed fire regime help maintain a high biodiversity level and maintain historic landscape?
Floodplain protection	HIGH	Wetland	Is park wetland as "intact" as possible?
Outside Development	HIGH	Park viewshed.	Is modern development intruding upon historic view from park?
Slope Failure	HIGH	Park streams, cultural landscaping.	Is slope failure being exacerbated by park management actions?
Viewscape	HIGH	Natural scene.	Does development adjoining the park detract from the experience of being in a natural setting?
Water Quality (Surface) (Compliance with Clean Water Act)	HIGH	Park waterbodies + associated flora/fauna.	Is poor water quality affecting aquatic animal/plant/microbiotic communities?
Wetlands	HIGH	Park flora/fauna.	Are park wetlands being damaged by development/pollution/siltation?
With/In Park Development	HIGH	Forest.	Will historic viewshed re-creation lead to habitat loss and wetland impacts.
Forest pests/Diseases	MED	Native forest structure.	Is the native forest structure being adversely affected by the presence of exotic forest pests/disease?
Genetic Contamination	MED	Maintained mowed areas.	Will the introduction of non-native/non-historic grass seed detract from the natural/historic scene?
Migratory Birds	MED	Biodiversity.	Do native migratory birds utilize the park to the greatest extent possible?
Native Pests	MED	VICK) Birds.	Are mosquitoes transmitting WNV?
Native Vegetation Restoration	MED	Park flora/fauna.	Is native revegetation beneficial for park biodiversity/historic scene recreation?
Native Species Overpopulation	MED	Biodiversity.	Are overpopulated native species becoming pests?

Appendix B. Continued.

Management Issues	Priority	Significant Natural Resources Impacted	Monitoring Questions
Night Sky	MED	Atmospheric clarity.	Is city-generated light and pollution significantly decreasing the visibility of night sky celestial objects?
Non-NPS/ Inholding Issues	MED	Cultural landscape.	Are inholdings detracting from the integrity of the cultural landscape?
Poaching	MED	Park fauna.	Is poaching impacting wildlife population levels?
Right-of-ways/Easements	MED	Park flora/fauna/water quality.	Do roadway/railroad ROWs contribute to exotic species establishment/increase in fire frequency/trash deposition?
Water Quality (Ground)	MED	Groundwater-Springs originating in park.	Have environmental toxins on surface infiltrated into groundwater?
Water Quantity (Ground Water)	MED	Bayous	Are unnatural/excessive water depletions affecting water levels in park bayous?
Water Quantity (Surface Water)	MED	Bayous/Wetlands.	Are unnatural water depletions/diversions affecting water levels in bayous/wetlands within park?
Air Quality (Compliance with Clean Air Act)	LOW	All encompassing.	Is poor air quality affecting the health and vigor of the park's native vegetation?
Fishing (Rec & Comm)	LOW	NA	NA
Hunting & Trapping	LOW	NA	NA
Mining	LOW	NA	NA
Native Wildlife Reintroductions	LOW	Aquatic fauna.	Will reintroduction of native, extirpated fish species improve the biodiversity of park streams?
Oil/Gas	LOW	NA	NA
Soundscape	LOW	NA	NA
Subsidence	LOW	Park terrain.	Are sinkholes developing at an unnatural rate?
T&E Species	LOW	NA	NA
Visitor Overuse	LOW	Park flora/fauna/water quality.	Is visitor overuse contributing to exotic species expansion into disturbed areas?
Exotics (Animals)	LOW	Park biodiversity.	Are feral animals/other exotics detrimentally affecting native animal/plant populations?

GIS DATA, DATA SETS

A list of available spatial and non-spatial data is provided for the park. Data have been organized into the following groups: GIS data, digital databases, NatureBib maps and abbreviations. GIS data have been further separated into three categories: park specific or local, statewide, and nationwide. A unique identifier has been given to each line of data as follows: "X_#", where "X" is a letter describing the data type (L=local GIS, S=Statewide GIS, N=Nationwide GIS and D=database) and "#" is a unique number. Basic information is provided to allow quick review of the publicly available data, including the title of the data and the organization from which the data are available. To view more extensive details about the data, an EXCEL workbook has been provided. The EXCEL workbook includes several datasheets for each of the aforementioned data categories. Among some of the additional details provided in the EXCEL workbook are partial metadata, web addresses, and descriptions of the data. Blank fields within the EXCEL workbook represent information that were not readily available, but can be gathered at a later date with a more in depth search of the available metadata.

General Park Information

Spatial Extent
32.39N 90.82E 32.31S 90.91W

County
Warren

Watershed	HUC
Lower Yazoo, Louisiana, Mississippi	8030208
Lower Mississippi-Natchez, Louisiana, Mississippi.	8060100

1:24,000 Quad
Long Lake
Redwood
Vicksburg East
Vicksburg West

1:100,000 Quad
Jackson

1:250,000 Quad
Jackson

Local: by Quarter-Quad, Quad, County or Watershed

ID	Available From	Originator/ Publisher	Location	Data	Scale	Structure	Resolution
L_1	MARIS	MARIS	Vicksburg East	DRG	1:24,000	Raster	
L_2	USGS	USGS	Vicksburg East	DEM	1:24,000	Raster	30 m
L_3	USGS	USGS	Vicksburg East	DLG_Boundaries	1:24,000	Vector	
L_4	USGS	USGS	Vicksburg East	DLG_Hydrography	1:24,000	Vector	
L_5	USGS	USGS	Vicksburg East	DLG_Hypsography	1:24,000	Vector	
L_6	USGS	USGS	Vicksburg East	DLG_Transportation	1:24,000	Vector	
L_7	MARIS	MARIS	Vicksburg East NW	DOQQ	1:40,000	Raster	1 m
L_8	MARIS	MARIS	Vicksburg East NE	DOQQ	1:40,000	Raster	1 m
L_9	MARIS	MARIS	Vicksburg East SW	DOQQ	1:40,000	Raster	1 m
L_10	MARIS	MARIS	Vicksburg East SE	DOQQ	1:40,000	Raster	1 m
L_11	MARIS	MARIS	Vicksburg West	DRG	1:24,000	Raster	
L_12	USGS	USGS	Vicksburg West	DEM		Raster	30 m
L_13	USGS	USGS	Vicksburg West	DLG_Boundaries	1:24,000	Vector	
L_14	USGS	USGS	Vicksburg West	DLG_Hydrography	1:24,000	Vector	
L_15	USGS	USGS	Vicksburg West	DLG_Hypsography	1:24,000	Vector	
L_16	USGS	USGS	Vicksburg West	DLG_Transportation	1:24,000	Vector	
L_17	MARIS	MARIS	Vicksburg West NW	DOQQ	1:40,000	Raster	1 m
L_18	MARIS	MARIS	Vicksburg West NE	DOQQ	1:40,000	Raster	1 m
L_19	MARIS	MARIS	Vicksburg West SW	DOQQ	1:40,000	Raster	1 m
L_20	MARIS	MARIS	Vicksburg West SE	DOQQ	1:40,000	Raster	1 m
L_21	MARIS	MARIS	Redwood	DRG	1:24,000	Raster	
L_22	USGS	USGS	Redwood	DEM	1:24,000	Raster	30 m
L_23	USGS	USGS	Redwood	DLG_Boundaries	1:24,000	Vector	
L_24	USGS	USGS	Redwood	DLG_Hydrography	1:24,000	Vector	
L_25	USGS	USGS	Redwood	DLG_Hypsography	1:24,000	Vector	
L_26	USGS	USGS	Redwood	DLG_Transportation	1:24,000	Vector	
L_27	MARIS	MARIS	Redwood NW	DOQQ	1:40,000	Raster	1 m
L_28	MARIS	MARIS	Redwood NE	DOQQ	1:40,000	Raster	1 m
L_29	MARIS	MARIS	Redwood SW	DOQQ	1:40,000	Raster	1 m
L_30	MARIS	MARIS	Redwood SE	DOQQ	1:40,000	Raster	1 m

Local: by Quarter-Quad, Quad, County or Watershed

ID	Available From	Originator/ Publisher	Location	Data	Scale	Structure	Resolution
L_31	MARIS	MARIS	Long Lake	DRG	1:24,000	Raster	
L_32	USGS	USGS	Long Lake	DEM	1:24,000	Raster	30 m
L_33	USGS	USGS	Long Lake	DLG_Boundaries	1:24,000	Vector	
L_34	USGS	USGS	Long Lake	DLG_Hydrography	1:24,000	Vector	
L_35	USGS	USGS	Long Lake	DLG_Hypsography	1:24,000	Vector	
L_36	USGS	USGS	Long Lake	DLG_Transportation	1:24,000	Vector	
L_37	MARIS	MARIS	Long Lake NW	DOQQ	1:40,000	Raster	1 m
L_38	MARIS	MARIS	Long Lake NE	DOQQ	1:40,000	Raster	1 m
L_39	MARIS	MARIS	Long Lake SW	DOQQ	1:40,000	Raster	1 m
L_40	MARIS	MARIS	Long Lake SE	DOQQ	1:40,000	Raster	1 m
L_41	MARIS	MSDEQ	Warren County	Agricultural Chemical Sampling Sites		Vector	
L_42	MARIS	USBOC	Warren County	Airport Runways	1:100,000	Vector	
L_43	MARIS	USBOC	Warren County	Census Block Groups	1:100,000	Vector	
L_44	MARIS	USBOC	Warren County	Census Block Numbering Areas	1:100,000	Vector	
L_45	MARIS	USBOC	Warren County	Census Blocks	1:100,000	Vector	
L_46	MARIS	USBOC	Warren County	County Border	1:100,000	Vector	
L_47	MARIS	USGS_DLG, MSDOT	Warren County	County Roads and City Streets	1:100,000	Vector	
L_48	MARIS	USDA-SCS	Warren County	County Soils	1:20,000	Vector	
L_49	MARIS	MARIS	Warren County	DEM	1:24,000	Raster	30 m
L_50	MARIS	MARIS	Warren County	DEM	1:24,000	Raster	10 m
L_51	MARIS	MSPUS	Warren County	Electric Utility Service Areas	1:24,000 1:100,000	Vector	
L_52	MARIS	MSDWFP	Warren County	Environmentally Sensitive Areas	1:24,000	Vector	
L_53	MARIS	TNVA/MSFC	Warren County	Forest Industry Sites	1:24,000	Vector	
L_54	MARIS	MSPUS	Warren County	Gas Utility Service Areas	1:24,000 1:100,000	Vector	
L_55	MARIS	USBOC, MSDECD	Warren County	Inactive Railroads	1:100,000	Vector	
L_56	MARIS	USGS_DLG	Warren County	Intermittent Streams	1:100,000	Vector	
L_57	MARIS	UMS-MSMRI	Warren County	Natural Gas Pipelines	varies	Vector	
L_58	MARIS	USGS_DLG	Warren County	Perennial Streams	1:100,000	Vector	
L_59	MARIS	DEQ	Warren County	Permitted Wells	1:24,000	Vector	

Local: by Quarter-Quad, Quad, County or Watershed

ID	Available From	Originator/ Publisher	Location	Data	Scale	Structure	Resolution
L_60	MARIS	USGS_DLG, MSDOT	Warren County	Primary Roads	1:100,000	Vector	
L_61	MARIS	USBOC, MSDECD	Warren County	Railroads	1:100,000	Vector	
L_62	MARIS	DEQ	Warren County	RCRIS Sites	1:24,000	Vector	
L_63	MARIS	USGS_DLG, MSDOT	Warren County	Secondary Roads	1:100,000	Vector	
L_64	MARIS		Warren County	Sections	1:24,000	Vector	
L_65	MARIS	MSPUS	Warren County	Sewer Utility Service Areas	1:24,000 1:100,000	Vector	
L_66	MARIS	DEQ	Warren County	Superfund Sites (CERCLA)	1:24,000	Vector	
L_67	MARIS	MSDEQ	Warren County	Surface Geology	1:500,000	Vector	
L_68	MARIS	MSPUS	Warren County	Telephone Utility Service Areas	1:24,000 1:100,000	Vector	
L_69	MARIS	MSEMA	Warren County	Toxic Release Inventory	1:24,000	Vector	
L_70	MARIS	USBOC, USGS_DLG	Warren County	Transmission Lines	1:100,000	Vector	
L_71	MARIS	USGS_DLG	Warren County	USGS Land Use	1:250,000	Vector	
L_72	MARIS	USGS	Warren County	USGS Private Wells	1:24,000	Vector	
L_73	MARIS	USGS	Warren County	USGS Public Wells	1:24,000	Vector	
L_74	MARIS		Warren County	Waste Treatment Impoundments		Vector	
L_75	MARIS	DEQ	Warren County	Wastewater Discharge Sites	1:24,000	Vector	
L_76	MARIS	MSPUS	Warren County	Water Utility Service Areas	1:24,000 1:100,000	Vector	
L_77	USDA/NRCS	NRCS	Warren County	SSURGO - Soils		Vector	
L_78	USGS	FEMA	Warren County	Q3 Flood Data		Vector	
L_79	USGS		Warren County	Tiger/Line 2000		Vector	
L_80	USGS		Warren County	Tiger/Line 2002		Vector	
L_81	USGS	EPA	Jackson 1:250,000 Quad	Composite Them Grid Format	1:250,000	Raster	200 m
L_82	USGS	EPA	Jackson 1:250,000 Quad	Census County Subdivision	1:250,000	Vector	
L_83	USGS	EPA	Jackson 1:250,000 Quad	Federal Land	1:250,000	Vector	
L_84	USGS	EPA	Jackson 1:250,000 Quad	Hydrologic Units	1:250,000	Vector	
L_85	USGS	EPA	Jackson 1:250,000 Quad	Land Use/Land Cover	1:250,000	Vector	
L_86	USGS	EPA	Jackson 1:250,000 Quad	Political Units	1:250,000	Vector	
L_87	USGS	EPA	Jackson 1:250,000 Quad	State Land	1:250,000	Vector	

Local: by Quarter-Quad, Quad, County or Watershed

ID	Available From	Originator/ Publisher	Location	Data	Scale	Structure	Resolution
L_88	USGS		Jackson_E 1:100,000 Quad	DLG	1:100,000	Vector	
L_89	USGS		Jackson_W 1:100,000 Quad	DLG	1:100,000	Vector	
L_90	USGS		Jackson 1:250,000 Quad	DRG	1:250,000	Raster	
L_91	USGS		Jackson 1:250,000 Quad	DRG	1:250,000	Raster	
L_92	USGS	USGS/EPA	Lower Mississippi-Natchez	NHD		Vector	
L_93	USGS	USGS/EPA	Lower Yazoo	NHD		Vector	
L_94	USGS The National Map		32.72N-90.76E 32.26S -90.98W	MODIS NDVI day 1		Raster	1 km
L_95	USGS The National Map		32.72N-90.76E 32.26S -90.98W	MODIS NDVI day 2		Raster	1 km
L_96	USGS The National Map		32.72N-90.76E 32.26S -90.98W	MODIS NDVI day 3		Raster	1 km
L_97	USGS The National Map		32.72N-90.76E 32.26S -90.98W	MODIS NDVI day 4		Raster	1 km
L_98	USGS The National Map		32.72N-90.76E 32.26S -90.98W	MODIS NDVI day 5		Raster	1 km
L_99	USGS The National Map		32.72N-90.76E 32.26S -90.98W	MODIS NDVI day 6		Raster	1 km
L_100	USGS The National Map		32.72N-90.76E 32.26S -90.98W	MODIS NDVI day 7		Raster	1 km
L_101	USGS The National Map		32.72N-90.76E 32.26S -90.98W	NED		Raster	10 m
L_102	USGS The National Map		32.72N-90.76E 32.26S -90.98W	NED		Raster	30 m
L_103	USGS The National Map		32.72N-90.76E 32.26S -90.98W	NLCD		Raster	30 m
L_104	USGS The National Map		32.72N-90.76E 32.26S -90.98W	SRTM		Raster	30 m
L_105	USGS The National Map		32.72N-90.76E 32.26S -90.98W	SRTM		Raster	90 m

Statewide

ID	Available From	Originator/ Publisher	Location	Data	Scale	Structure	Resolution
S_1	USFS	USFS	13 state region (including MS)	LAA - Assessment Projects by watershed		Vector	
S_2	USFS	USFS	13 state region (including MS)	LAA - Assessment Projects by county		Vector	
S_3	USFS	USFS	13 state region (including MS)	LAA - Assessment Projects by ecoregion		Vector	
S_4	USFS	USFS	State	LAA - Forest Area Density		Raster	30 m
S_5	USFS	USFS	State	LAA - Forest Area Connectivity		Raster	30 m
S_6	USFS	USFS	State	LAA - Forest Fragmentation Index		Raster	30 m
S_7	USFS	USFS	State	LAA - Human Use Index		Raster	30 m
S_8	USFS	USFS	State	LAA - Land Cover Diversity		Raster	30 m
S_9	USFS	USFS	State	LAA - Land Cover Contagion		Raster	30 m
S_10	USFS	USFS	State	LAA - Landscape Pattern Type Index A		Raster	30 m
S_11	USGS	USGS	State	National Land Cover		raster	30 m
S_12	USGS	USGS	State	GAP		raster	
S_13	USDA/NRCS	NRCS	State	STATSGO - Soils	1:250,000	Vector	
S_14	MARIS	MARIS	State	7.5 minute Quadrangle Grid	1:24,000	Vector	
S_15	MARIS	MARIS	State	Lat/Long Grid		Vector	
S_16	MARIS	NGS	State	MS High Accuracy Network Sites		Vector	
S_17	MARIS	USGS	State	Survey Districts	1:24,000	Vector	
S_18	MARIS	USGS	State	Townships	1:24,000	Vector	
S_19	MARIS	USBOC	State	1990 Block Groups	1:100,000	Vector	
S_20	MARIS	USBOC	State	1990 Block Numbering Areas/Tracts	1:100,000	Vector	
S_21	MARIS	USBOC	State	2000 Block Groups	1:100,000	Vector	
S_22	MARIS	USBOC	State	2000 Block Numbering Areas/Tracts	1:100,000	Vector	
S_23	MARIS	USBOC	State	2000 Blocks	1:100,000	Vector	
S_24	MARIS	USBOC, MSDECD	State	Abandoned Railroads	1:100,000	Vector	
S_25	MARIS	USBOC, MSDECD	State	Active Railroads	1:100,000	Vector	
S_26	MARIS	USBOC	State	Airport Runways	1:100,000	Vector	
S_27	MARIS		State	County Roads		Vector	
S_28	MARIS	USGS_DLG, MSDOT	State	Primary Roads	1:100,000	Vector	

Statewide

ID	Available From	Originator/ Publisher	Location	Data	Scale	Structure	Resolution
S_29	MARIS	USGS_DLG, MSDOT	State	Secondary Roads	1:100,000	Vector	
S_30	MARIS		State	Major Power Company Regions		Vector	
S_31	MARIS	UMS-MSMRI	State	Natural Gas Pipelines	varies	Vector	
S_32	MARIS	USBOC, USGS_DLG	State	Transmission Lines	1:100,000	Vector	
S_33	MARIS	MSBCI	State	Choctaw Indian Boundaries	1:24,000	Vector	
S_34	MARIS	USBOC	State	County Borders	1:100,000	Vector	
S_35	MARIS	MSIHL	State	Multi-County Industrial Districts	1:100,000	Vector	
S_36	MARIS	MSDWFP	State	National Wildlife Refuges	1:100,000	Vector	
S_37	MARIS	MSIHL	State	Planning and Development Districts	1:100,000	Vector	
S_38	MARIS	MSIHL	State	Public Service Commission Districts	1:100,000	Vector	
S_39	MARIS		State	State Outline		Vector	
S_40	MARIS	USACE	State	US Corps of Engineers Districts	1:100,000	Vector	
S_41	MARIS	MSDWFP	State	Wildlife Management Areas	1:100,000	Vector	
S_42	MARIS	USDA	State	Catfish Ponds	1:100,000	Vector	
S_43	MARIS	MSDEQ	State	Dam Locations	1:24,000	Vector	
S_44	MARIS	DEQ	State	Detailed Coastline	1:10,000	Vector	
S_45	MARIS		State	Discharge Elimination Sites		Vector	
S_46	MARIS	USDA_SCS	State	Hydrologic Units (Basins)	1:250,000	Vector	
S_47	MARIS	USGS_DLG	State	Intermittent Streams	1:100,000	Vector	
S_48	MARIS	USGS_DLG	State	Major Rivers	1:100,000	Vector	
S_49	MARIS	USGS_DLG	State	Mississippi River	1:100,000	Vector	
S_50	MARIS	MSDH	State	MS Dept. of Health Wells	1:24,000	Vector	
S_51	MARIS		State	MS Office of Land and Water Resource Permit Wells		Vector	
S_52	MARIS	USGS_DLG	State	Perennial Streams	1:100,000	Vector	
S_53	MARIS		State	Polygon Water GT 25 Acres		Vector	
S_54	MARIS		State	Surface Impoundment Sites		Vector	
S_55	MARIS	USGS	State	USGS Private Wells	1:24,000	Vector	
S_56	MARIS	USGS	State	USGS Public Wells	1:24,000	Vector	
S_57	MARIS	MSDECD	State	Water Development Districts	1:100,000	Vector	
S_58	MARIS	SCS	State	Watersheds	1:100,000	Vector	
S_59	MARIS	DEQ	State	Wellhead Protection Areas	1:24,000	Vector	

Statewide

ID	Available From	Originator/ Publisher	Location	Data	Scale	Structure	Resolution
S_60	MARIS	MSDWFP	State	Environmentally Sensitive Areas	1:24,000	Vector	
S_61	MARIS	USDA-FS	State	Historic Forest Boundaries (1820-1920)	1:1,584,000	Vector	
S_62	MARIS	USDA-SCS	State	Major Land Resource Areas	1:250,000	Vector	
S_63	MARIS	MSU	State	MS Forest Habitats	1:500,000	Vector	
S_64	MARIS	MARIS	State	Physiographic Regions	1:250,000	Vector	
S_65	MARIS	USGS-SCS	State	Soil Associations	1:250,000	Vector	
S_66	MARIS	MSDEQ	State	Surface Geology	1:500,000	Vector	
S_67	MARIS		State	EPA Regulated Facilities		Vector	
S_68	MARIS	TNVA/MSFC	State	MS Forest Industry Sites	1:24,000	Vector	
S_69	MARIS	USFS	State	National Forest Boundaries	1:24,000	Vector	
S_70	MARIS	USFS	State	National Forest Ownership Boundaries	1:24,000	Vector	
S_71	MARIS	USGS	State	National Parks	1:24,000	Vector	
S_72	MARIS		State	National Registry Sites		Vector	
S_73	MARIS	DEQ	State	RCRA Sites	1:24,000	Vector	
S_74	MARIS		State	Recreational Facilities		Vector	
S_75	MARIS	MSDWFP	State	State Parks	1:24,000	Vector	
S_76	MARIS	MSEMA	State	Toxic Release Inventory Sites	1:24,000	Vector	
S_77	MARIS	MARIS	State	Underground Storage Tanks	1:100,000	Vector	
S_78	MARIS	MSDEQ	State	Agricultural Chemical Sampling Sites		Vector	
S_79	MARIS	USBOC	State	Census Block Groups	1:100,000	Vector	
S_80	MARIS	USBOC	State	Census Block Numbering Areas	1:100,000	Vector	
S_81	MARIS	USGS_DLG	State	Water Bodies	1:100,000	Vector	
S_82	MARIS	DEQ	State	Permitted Wells	1:24,000	Vector	
S_83	MARIS	DEQ	State	Superfund Sites (CERCLA)	1:24,000	Vector	
S_84	MARIS	DEQ	State	Wastewater Discharge Sites	1:24,000	Vector	
S_85	MARIS	USGS_DLG, MSDOT	State	County Roads & City Streets	1:100,000	Vector	
S_86	MARIS		State	Waste Treatment Impoundments		Vector	
S_87	USGS		State	Cultural Landmarks - lines		Vector	
S_88	USGS		State	Cultural Landmarks - points		Vector	
S_89	USGS		State	Populated Places-points		Vector	
S_90	USGS		State	Populated Places-polygon		Vector	
S_91	USGS		State	STATSGO - Soils		Vector	

Statewide

ID	Available From	Originator/ Publisher	Location	Data	Scale	Structure	Resolution
S_92	USGS		State	Physiography- lines		Vector	
S_93	USGS		State	Hydrography_drainage-network		Vector	
S_94	USGS		State	Hydrography_drainage-points		Vector	
S_95	USGS		State	Hydrography_drainage supplemental-points		Vector	
S_96	USGS		State	Hydrography_Ocean Features-lines		Vector	
S_97	USGS		State	Hypsography network		Vector	
S_98	USGS		State	Hypsography points		Vector	
S_99	USGS		State	Hypsography Supplemental lines		Vector	
S_100	USGS		State	Hypsography Supplemental points		Vector	
S_101	USGS		State	Land Cover - points		Vector	
S_102	USGS		State	Land Cover - polygons		Vector	
S_103	USGS		State	Transportation_aeronautical points		Vector	
S_104	USGS		State	Transportation_railroad-lines		Vector	
S_105	USGS		State	Transportation_roads-lines		Vector	
S_106	USGS		State	Transportation_structure-lines		Vector	
S_107	USGS		State	Utilities-lines		Vector	
S_108	USGS		State	Vegetation-polygons		Vector	

Nationwide

ID	Available From	Originator/ Publisher	Location	Data	Scale	Structure	Resolution
N_1	TNRIS		Nationwide	USA Boundary			
N_2	TGLO	NPS, WRD	Nationwide	National Parks	1:24,000	Vector	
N_3	USGS	USGS	Nationwide	Geology of the US			
Data below found at: http://mrdata.usgs.gov/sddpftp.html							
N_4	USGS	USGS	Nationwide	Igneous rocks PLUTO		Vector	
N_5	USGS	USGS	Nationwide	NURE Sediment Chemistry		Raster	
N_6	USGS	USGS	Nationwide	Soil Chemistry		Vector	
N_7	USGS	USGS	Nationwide	Soils PLUTO		Vector	
N_8	USGS	USGS	Nationwide	Soils RASS		Vector	
N_9	USGS	USGS	Nationwide	Unconsolidated Sediments PLUTO		Vector	
N_10	USGS	USGS	Nationwide	Unconsolidated Sediments RASS		Vector	
N_11	USGS	USGS	Nationwide	US Geology	1:2,500,000	Raster	1000 m
N_12	USGS	USGS	Nationwide	US Geology [Geologic Faults]	1:2,500,000	Raster	1000 m
N_13	USGS	USGS	Nationwide	US Aeromagnetics		Raster	1000 m
N_14	USGS	USGS	Nationwide	US Bouguer Gravity Field		Raster	4 km
N_15	USGS	USGS	Nationwide	US Isostatic Gravity Field		Raster	4 km
N_16	USGS	USGS	Nationwide	US Magnetics NW Illumination		Raster	2 km
N_17	USGS	USGS	Nationwide	Active Mines and Mineral Plants		Vector	
N_18	USGS	USGS	Nationwide	Mineral Availability System		Vector	
N_19	USGS	USGS	Nationwide	Mineral Resource Data		Vector	
N_20	USGS	USGS	Nationwide	Cities	1:2,000,000	Vector	
N_21	USGS	USGS	Nationwide	Counties		Vector	
N_22	USGS	USGS	Nationwide	Elevated Shaded Relief		Raster	2km
N_23	USGS	USGS	Nationwide	Federal Lands	1:2,000,000	Vector	
N_24	USGS	USGS	Nationwide	Hydrologic Units	1:250,000 1:100,000	Vector	
N_25	USGS	USGS	Nationwide	Hydrology	1:2,000,000	Vector	
N_26	USGS	USGS	Nationwide	Land Cover		Raster	1000 m
N_27	USGS	USGS	Nationwide	Railroads	1:100,000	Vector	
N_28	USGS	USGS	Nationwide	Roads	1:3,000,000	Vector	
N_29	USGS	USGS	Nationwide	Urban Areas		Vector	
N_30	USGS	USGS	Nationwide	USA	1:25,000,000	Vector	

Nationwide

ID	Available From	Originator/ Publisher	Location	Data	Scale	Structure	Resolution
N_31	USGS	USGS	Nationwide	24000 Quadrangle Boundaries		Vector	
N_32	USGS	USGS	Nationwide	250000 Quadrangle LU/LC	1:250,000	Vector	
Data below found at: www.epa.gov/mrlc/data.html (a site with helpful links to spatial and non-spatial data, nationwide)							
N_33	NRCS/USDA	NRCS/USDA	Nationwide	Tiger 2002 Road			
N_34	NRCS/USDA	NRCS/USDA	Nationwide	Tiger 2002 Railroad			
N_35	NRCS/USDA	NRCS/USDA	Nationwide	Tiger 2002 hydrography			
N_36	NRCS/USDA	NRCS/USDA	Nationwide	Tiger 2000 water			
N_37	NRCS/USDA	NRCS/USDA	Nationwide	FEMAQ3 Flood Data	1:24,000		
N_38	NRCS/USDA	NRCS/USDA	Nationwide	8-digit hydrologic units	1:250,000		
N_39	NRCS/USDA	NRCS/USDA	Nationwide	DRG County Mosaic by NRCS			
N_40	NRCS/USDA	NRCS/USDA	Nationwide	DRG	1:24,000		
N_41	NRCS/USDA	NRCS/USDA	Nationwide	DRG	1:100,000		
N_42	NRCS/USDA	NRCS/USDA	Nationwide	DRG	1:250,000		
N_43	NRCS/USDA	NRCS/USDA	Nationwide	Quad 1:24,000 map index			
N_44	NRCS/USDA	NRCS/USDA	Nationwide	Quad 1:100,000 map index			
N_45	NRCS/USDA	NRCS/USDA	Nationwide	Quad 1:250,000 map index			
N_46	NRCS/USDA	NRCS/USDA	Nationwide	Quad 1 degree by state map index			
N_47	NRCS/USDA	NRCS/USDA	Nationwide	National Elevation Dataset			
N_48	NRCS/USDA	NRCS/USDA	Nationwide	DEM			
N_49	NRCS/USDA	NRCS/USDA	Nationwide	DOQ County Mosaic by APFO			
N_50	NRCS/USDA	NRCS/USDA	Nationwide	ErMapper Ortho Mosaic by NRCS			
N_51	NRCS/USDA	NRCS/USDA	Nationwide	National Land Cover Dataset by State			
N_52	NRCS/USDA	NRCS/USDA	Nationwide	Soil Survey Geographic (SSURGO) data base			
N_53	NRCS/USDA	NRCS/USDA	Nationwide	Annual Average Precipitation by state			
N_54	NRCS/USDA	NRCS/USDA	Nationwide	Monthly Average Precipitation by state			
N_55	USGS	ESRI	Nationwide	United States			
Data below found at: http://nationalatlas.gov/atlasftp.html							
N_56	NationalAtlas	USDA/NRCS	Nationwide	Average Annual Precipitation	1:2,000,000	vector	
N_57	NationalAtlas	USGS	Nationwide	Breeding Bird Survey Routes	1:2,000,000	vector	
N_58	NationalAtlas	USGS	Nationwide	County Boundaries	1:2,000,000	vector	
N_59	NationalAtlas	USACE	Nationwide	Dams	1:2,000,000	vector	

Nationwide

ID	Available From	Originator/ Publisher	Location	Data	Scale	Structure	Resolution
N_60	NationalAtlas	USFS	Nationwide	Ecoregions	1:2,000,000	vector	
N_61	NationalAtlas	USFS/USGS	Nationwide	Forest Cover Types	1:2,000,000	raster	
N_62	NationalAtlas	USGS	Nationwide	Forest Fragmentation Classification	1:2,000,000	raster	
N_63	NationalAtlas	USEPA/USGS	Nationwide	Forest Fragmentation Causes	1:2,000,000	raster	1 km
N_64	NationalAtlas	USEPA	Nationwide	Forest Fragmentation Causes	1:2,000,000	raster	540 m
N_65	NationalAtlas	USEPA	Nationwide	Forest Fragmentation Causes	1:2,000,000	raster	270 m
N_66	NationalAtlas	USGS	Nationwide	Generalized Geologic Map	1:2,000,000	vector	
N_67	NationalAtlas	USGS	Nationwide	Hydrologic Unit Boundaries	1:2,000,000	vector	
N_68	NationalAtlas	USGS	Nationwide	Invasive Species_Zebra Mussels	1:2,000,000	vector	
N_69	NationalAtlas	USGS	Nationwide	Land Cover Characteristics	1:2,000,000	raster	
N_70	NationalAtlas	USGS	Nationwide	Land Cover Diversity	1:2,000,000	raster	
N_71	NationalAtlas	USGS	Nationwide	Mineral Operations_Agriculture	1:2,000,000	vector	
N_72	NationalAtlas	USGS	Nationwide	Mineral Operations_Construction	1:2,000,000	vector	
N_73	NationalAtlas	USGS	Nationwide	Mineral Operations_Ferrous Metal Mines	1:2,000,000	vector	
N_74	NationalAtlas	USGS	Nationwide	Mineral Operations_Ferrous Metals Processing Plants	1:2,000,000	vector	
N_75	NationalAtlas	USGS	Nationwide	Mineral Operations_Miscellaneous Industrial	1:2,000,000	vector	
N_76	NationalAtlas	USGS	Nationwide	Mineral Operations_Nonferrous Metal Mines	1:2,000,000	vector	
N_77	NationalAtlas	USGS	Nationwide	Mineral Operations_Nonferrous Metal Processing Plants	1:2,000,000	vector	
N_78	NationalAtlas	USGS	Nationwide	Mineral Operations_Refractory, Abrasive, and other Industrial	1:2,000,000	vector	
N_79	NationalAtlas	USGS	Nationwide	Mineral Operations_Sand and Gravel	1:2,000,000	vector	
N_80	NationalAtlas	USGS	Nationwide	Mineral Operations_Stone, Crushed	1:2,000,000	vector	
N_81	NationalAtlas	USGS	Nationwide	NAWQA Surface-Water Sampling Sites	1:2,000,000	vector	
N_82	NationalAtlas	USGS	Nationwide	North American Bat Ranges	1:2,000,000	vector	
N_83	NationalAtlas	USGS	Nationwide	Parkways and Scenic Rivers	1:2,000,000	vector	
N_84	NationalAtlas	USGS	Nationwide	Principal Aquifers	1:2,000,000	vector	
N_85	NationalAtlas	USGS	Nationwide	Public Land Survey	1:2,000,000	vector	
N_86	NationalAtlas	USGS	Nationwide	Railroads	1:2,000,000	vector	
N_87	NationalAtlas	USGS	Nationwide	Realtime Streamflow Stations	1:2,000,000	vector	
N_88	NationalAtlas	USGS	Nationwide	Roads	1:2,000,000	vector	
N_89	NationalAtlas	USGS	Nationwide	Shaded Relief of North America	1:2,000,000	raster	
N_90	NationalAtlas	USGS	Nationwide	States	1:2,000,000	vector	
N_91	NationalAtlas	USGS	Nationwide	Streams and Waterbodies	1:2,000,000	vector	
N_92	NationalAtlas	USGS	Nationwide	Wilderness Areas	1:2,000,000	vector	

Nationwide

ID	Available From	Originator/ Publisher	Location	Data	Scale	Structure	Resolution
N_93	NationalAtlas	USGS	Nationwide	Amphibian Distributions			
N_94	NationalAtlas	USGS	Nationwide	Butterflies			
N_95	NationalAtlas	USDA/NRCS	Nationwide	Invasive Species_Chinese Privet			
N_96	NationalAtlas	USDA/NRCS	Nationwide	Invasive Species_Tallowtree			
N_97	NationalAtlas	USDA/NRCS	Nationwide	Invasive Species_Common Gorse			
N_98	NationalAtlas	USDA/NRCS	Nationwide	Invasive Species_Leafy Spurge			
N_99	NationalAtlas	USDA/NRCS	Nationwide	Invasive Species_Purple Loosestrife			
N_100	NationalAtlas	USGS	Nationwide	Moths			
N_101	NationalAtlas	CDC	Nationwide	West Niles Virus_Human Cases			
N_102	NationalAtlas	CDC	Nationwide	West Niles Virus_Mosquito Surveillance			
N_103	NationalAtlas	CDC	Nationwide	West Niles Virus_Sentinel Flock Surveillance			
N_104	NationalAtlas	CDC	Nationwide	West Niles Virus_Veterinary Cases			
N_105	NationalAtlas	CDC	Nationwide	West Niles Virus_Wild Bird Cases			
N_106	NationalAtlas	CDC	Nationwide	West Niles Virus_Human Cases			
N_107	NationalAtlas	CDC	Nationwide	West Niles Virus_Mosquito Surveillance			
N_108	NationalAtlas	CDC	Nationwide	West Niles Virus_Sentinel Flock Surveillance			
N_109	NationalAtlas	CDC	Nationwide	West Niles Virus_Veterinary Cases			
N_110	NationalAtlas	CDC	Nationwide	West Niles Virus_Wild Bird Cases			
N_111	NationalAtlas	USGS NWHC	Nationwide	Wildlife Mortality_Frequency Data			
N_112	NationalAtlas	USGS NWHC	Nationwide	Wildlife Mortality_Botulism			
N_113	NationalAtlas	USGS NWHC	Nationwide	Wildlife Mortality_Cholera			
N_114	NationalAtlas	USGS NWHC	Nationwide	Wildlife Mortality_Lead Poisoning			
N_115	NationalAtlas	USGS NWHC	Nationwide	Wildlife Mortality_OP/CARB Poisoning			

Databases

ID	Database	Query info down to… park	county	state	other	Who
D_1	Amphibian Counts Database	?	?	?	?	USGS
D_2	ARMI	no	no	no	no	USGS
D_3	BEST_CEE-TV	no	no	yes	HUC, City, Species	USGS
D_4	BEST_Large River Fish Health	no	no	no	station	USGS
D_5	Bird Point Count Database	yes	no	no	Point Count	USGS
D_6	Breeding Bird Census	?	?	?	?	USGS
D_7	Breeding Bird Survey	no	no	yes	route	USGS
D_8	Butterflies of North America	no	yes	yes		USGS
D_9	Chinese Privet	no	yes	yes		NRCS/USDA
D_10	Christmas Bird Count	no	no	yes	count	Audubon
D_11	Christmas Bird Count	no	no	no	count	USGS
D_12	eBird	no	yes	yes	any location	
D_13	Envirofacts_Air Releases (AIRS/AFS)		yes	yes	EPA region	EPA
D_14	Envirofacts_Environmental Radiation Ambient Monitoring System (ERAMS)		yes	yes	EPA region	EPA
D_15	Envirofacts_Multisystem Query		yes	yes	EPA region	EPA
D_16	Envirofacts_National Contaminant Occurrence Database (NCOD)		yes	yes	EPA region	EPA
D_17	Envirofacts_Toxic Release Inventory (TRI)		yes	yes	EPA region	EPA
D_18	Envirofacts_UV index		yes	yes	EPA region	EPA
D_19	Envirofacts_Water Discharge Permits (PCS)		yes	yes	EPA region	EPA
D_20	Forest Inventory and Analysis (FIA)	no	yes	yes	radius	USFS
D_21	Inventory and Monitoring on National Parks	yes				NPS
D_22	MAPS	no	no	yes	region, station	USGS
D_23	Mid-Winter Waterfowl Survey	no	no	yes	flyway, species, year	USFWS
D_24	Migratory Bird Data Center					USFWS/USGS
D_25	NAAMP	no	no	no	route	USGS
D_26	NARCAM	no	yes	no		USGS
D_27	National Atlas of the US					
D_28	NatureServe Explorer	no	no	yes	plant/animal, status	NatureServe
D_29	NBII			yes	can specify an area of interest with lat/long coordinates	USGS
D_30	NBII Bird Conservation node					USGS
D_31	Nonindigenous Aquatic Species (NAS)	no	no	yes	HUCs (2 and 6)	USGS

Databases

ID	Database	Query info down to… park	county	state	other	Who
D_32	NWIS Web Site	no	yes	yes	HUC, Sampling Site	USGS
D_33	NWQA Data Warehouse	no	no	no	study unit basin	USGS
D_34	PLANTS Database	no	no	yes		NRCS/USDA
D_35	Project Feeder Watch	no	no	yes		Cornell Lab of Ornithology
D_36	Waterbird Monitoring Partnership	no	no	no	site_ID	USGS
D_37	Waterfowl Breeding Population and Habitat Survey	no	no	?	species, year, strata	USFWS

NatureBib Maps

NBIB_ID	Author	Year	Title
539653	Amos, D. H.,	1987	Geologic map of the Jackson Quadrangle, Cape Girardeau County, Missouri Miscellaneous Field Studies Map
506874	Davis, R. W.,	1968	Availability of ground water in the parts of the Arlington and Wickliffe SW quadrangles in Jackson Purchase region, Kentucky, Hydrologic Investigations Atlas
506875	Green, J. W, and Childress, S. C.,	1974	Environmental geology of the Madison, Ridgeland, Jackson, and Jackson SE quadrangles; Hinds, Madison, and Rankin counties, Mississippi, Miss Geol, Econ Topogr Surv, Environ Geol Ser
539664	Holbrook, Drew F, Gilliland, William A., Luza, Kenneth V., Pope, David E., Wermund, E. Gerald, Miller, Robert A., Bush, William V., Jensen, Kathryn N., Fishman, William D., Richmond, Gerald M., Fullerton, David S., and Weide	1990	Quaternary geologic map of the Vicksburg 4 degrees X 6 degrees Quadrangle, United States Miscellaneous Investigations Series US Geological Survey
114405	National Park Service,	1949	Soil erosion plan
57854	National Park Service,	1959	Ground cover map-1862
57853	National Park Service,	1958	Ground cover map-1862
539645	No author,	1980	Aerial gamma ray and magnetic survey, Mississippi and Florida airborne survey, Jackson Quadrangle of Mississippi and Louisiana; final report
539650	Wilson, Kenneth V.,	1972	Floods in Jackson Quadrangle, Mississippi

Abbreviations	Definition	website
CIR	Color Infra-Red	
CTG	Composite Theme Grid	
DEM	Digital Elevation Model	
DEQ	Department of Environmental Quality	
DLG	Digital Line Graph	
DOQQ	Digital Ortho Quarter Quadrangle	
DRG	Digital Raster Graphics	
EMAP	Environmental Monitoring and Assessment Program	
FEMA	Federal Emergency Management Agency	
GAP	Gap Analysis Program	http://www.gap.uidaho.edu/
GIRAS	Geographic Information Retrieval and Analysis System	
GRS	Geographic Reference System	
LAA	Landscape Analysis and Assessment	http://www.srs.fs.usda.gov/4803/landscapes/index.html
LULC	Land Use/Land Cover	
MARIS	Mississippi Automated Resource Information System	http://www.maris.state.ms.us/HTM/about.htm
MODIS	Moderate Resolution Imagery Spectroradiometer	
MSBCI	MS Band of Choctaw Indians	
MSDECD	MS Department of Economic and Community Development	
MSDH	MS Department of Health	
MSDOT	MS Department of Transportation	
MSDWFP	MS Department of Wildlife, Fisheries, and Parks	
MSEMA	MS Emergency Management Agency	
MSFC	MS Forestry Commission	
MSIHL	Mississippi Institution of Higher Learning	
MSMRI	MS Mineral Resources Institute	
MSPUS	MS Public Utility Staff	
MSTM	Mississippi Transverse Mercator	
MSU	Mississippi State University	
NED	National Elevation Dataset	
NGS	National Geodetic Survey	
NHD	National Hydrography Dataset	http://nhd.usgs.gov/data.html
NLCD	National Landcover Data	http://www.epa.gov/mrlc/nlcd.html
SCS	Soil Conservation Service	
SDTS	Spatial Data Transfer Standard	http://data.geocomm.com/sdts/

Abbreviations	Definition	website
SPCS	State Plane Coordinate System	
SRTM	Shuttle Radar Topography Mission	
SSURGO	Soil Survey Geographic Database	http://www.ncgc.nrcs.usda.gov/branch/ssb/products/SSURGO/index.html
STATSGO	State Soil Geographic Database	http://www.ncgc.nrcs.usda.gov/branch/ssb/products/statsgo/index.html
TNVA	Tennessee Valley Authority	
UMS	University of Mississippi	
USACE	US Army Corps of Engineers	
USBOC	US Bureau of Census	
USDA	US Department of Agriculture	
USEPA	US Environmental Protection Agency	http://www.epa.gov/mrlc/data.html
USFS	United States Forest Service	http://www.srs.fs.usda.gov/4803/landscapes/index.html
USFWS	United States Fish and Wildlife Service	
USGS	United States Geologic Survey	http://mapping.usgs.gov/products.html#digital_data http://data.geocomm.com/
USGS **The National Map**	The National Map	http://seamless.usgs.gov/viewer.htm